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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,354	12/15/2003	Robert Oliver Buckingham	03485-P0009A	4073

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EXAMINER

PILKINGTON, JAMES

ART UNIT	PAPER NUMBER
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3682

MAIL DATE	DELIVERY MODE
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09/13/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/736,354	BUCKINGHAM ET AL.	
	Examiner	Art Unit	
	James Pilkington	3682	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6-10,12,13,15,17-26,28-33 and 36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-10,12,13,15,17-26,28-33 and 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 2003, 27 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Prosecution Application

The request filed on May 30, 2007 for a Continued Examination (RCE) is accepted and a RCE has been established. An action on the RCE follows.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the at least one wire extending from said first link and said second link (claims 1 and 36) must be shown or the feature(s) canceled from the claim(s). The drawings only appear to show that the cable extends through the first link 13 only. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

Art Unit: 3682

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 4, 5, 6-10, 12, 13, 15, 17-26, 28-33, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stelle, USP 3,266,059, in view of Irwin et al, USP 3,504,902.

Re clm 1, Stelle discloses a link assembly for a robot arm comprising:

- First and second link members (75-80) configured in a cooperating mating relationship
- At least one wire (106 or 108) extending from said first link member to said second member, said at least one wire including a preload so as to maintain said link assembly under compression (Stelle states that all the joints are prestressed (C4/L37-52), if the joints are prestressed and it is the cables that hold the joints together then the cables must be preloaded).

Stelle does not disclose a resilient elastomer disposed between said first and second members and the elastomer is bonded to both of the first and second link members, and is maintained under compression.

Irwin teaches a resilient elastomer (C3/L43-53) bearing disposed between two members (11 and 12) and the elastomer is bonded to both of the first and second link members (bonded at faces 13 and 14) and is maintained under compression (disposed between two elements) for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling (C1/L62-65) thus providing the predictable result of stabilizing the robot arm.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Stelle and provide a resilient elastomer bearing disposed between two members and the elastomer is bonded to both of the first and second link members, and is sufficiently thin and maintained under compression, as taught by Irwin, for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling thus providing the predictable result of stabilizing the robot arm.

****The examiner notes, regarding the "whereby" clause in clm 1, that it has been held that when a "whereby" clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention." Accordingly, the "whereby" clause in this instance serves to narrow the claim and has been given patentable weight by the examiner. See MPEP 2111.04.****

Re clm 2 and 9, Irwin discloses that the elastomer is made of plastic which is a synthetic rubber and/or a laminate (C3/L43-68).

Re clm 4, well a specific thickness is not disclosed by Irwin it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized a specific thickness range in order to conform to the compressional force

Art Unit: 3682

inputs, and/or cost specifications of the assembly, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re clm 6, Irwin discloses each surface of the elastomeric layer contiguous the member is secured (compressed between the members 11 and 12) so that in operation, relative movement between the members produces shear movement within the elastomer, the arrangement being such that the thinness of the layer reduces the tendency towards compression thereby imparting improved stability for the positioning of the components.

Re clm 7, Irwin discloses the elastomer means comprising a plurality of layers of elastomer (see Figures 3-8).

Re clm 8, Irwin discloses an interleaving rigid layer (17a-c and 20) is bonded to adjacent elastomer layers (16) to separate one layer from its neighbor (see Figures 6-8).

Re clm 10, Irwin discloses the interleaving layer (17a-c and 20) between each layer of elastomer (16) is of a material, which is bondable to or capable of being keyed to the elastomer (C3/L43-55).

Re clms 12 and 13, Irwin discloses that the interleaving layer comprises a metal layer, a resin layer, glass fiber, or a mat of either woven or unwoven material (C3/L43-55, Irwin discloses metal or plastic).

Re clm 15, Stelle discloses said at least one wire (106 or 108) comprises control means for controlling the movement (the wires are control means connected to a module) of said link assemblies within the segment.

Re clm 17, Stelle discloses that the control means comprises 3 wires (not shown in detail but Figure 5 shows multiple holes capable of receiving the wires also see C2/L48-50).

Re clm 18, Stelle discloses that the wires (106, 108) are tensioned to maintain the links under compression, the arrangement being such that application of differential tension between the wires causes or allows the segment to move or bend.

Re clm 19, Stelle in view of Irwin discloses that the first link member comprises an outer disc (98) having holes for control wires (Figures 5 and 6) and the second link member comprises an inner disk (88) which is adapted to be disposed generally inwardly of the outer disc (98) and which has a central bore (94) which has a bore to accommodate at least one of control and power means (100) for the work head and a rubber disc layer (Irwin).

Re clm 20, Stelle discloses a plurality of said segments (75-80) in which control means is provide for each segment.

Re clm 21, Stelle discloses each segment terminates in an end cap having wire conduit means for the control wires of other segments of the arm and anchorage means arcuately spaced about the cap for securing the control wires for the segment in question (Figure 6).

Re clm 22, Stelle discloses at least one of the members of each link is provided with means for guiding the wires from one end of the segment to the other (the holes).

Re clm 23, Stelle discloses each wire is disposed externally of the segment links and terminates in a ferrule (110, 112).

Re clm 24, Stelle discloses that each control wire is operated by an actuator (C3/L3-17).

Re clm 25, Stelle discloses each that each cable is provided with an actuator. Also, it would have been obvious to one of ordinary skill in the art at the time of the invention to pass the cables around pulleys to help align the cables before entering the segment.

Re clm 26, Stelle discloses each link is produced as a pair of half links which permit back to back assembly, the arrangement being such that an inner link (88) and an outer link (98) may be assembled with its associated bonding layer to form unitary link components (75-80), a plurality of which together can be assembled to form a segment.

Re clm 28, Stelle discloses locating dowels (rounded portion of 88) provided in mating holes (90).

Re clms 29 and 30, Stelle discloses an external sleeve (86) which is a bellows-type sheath (see Figure 4).

Re clm 31, Stelle discloses that the sleeve comprises a material and a configuration which is selected to increase the torsional stiffness of the arm (rib portions can only compress until the contact one another).

Art Unit: 3682

Re clms 32 and 33, the sleeve is capable of being filled with a lubricant.

Re clm 36, Stelle discloses a link assembly for a robot arm comprising:

- First and third link members (75-80) having respectively adjacent spherical surfaces (88, 90) formed to fit together
- At least one wire (106 or 108) extending from said first link member to said third member said at least one wire including a preload so as to maintain said link assembly under compression (Stelle states that all the joints are prestressed (C4/L37-52), if the joints are prestressed and it is the cables that hold the joints together then the cables must be preloaded).

Stelle does not disclose a resilient elastomer disposed between said first and second members and the elastomer is bonded to both of the first and second link members, and is sufficiently thin and maintained under compression.

Irwin teaches a resilient elastomer (C3/L43-53) bearing disposed between two members (11 and 12) and the elastomer is bonded to both of the first and second link members (bonded at faces 13 and 14) and is maintained under compression (disposed between two elements) for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling (C1/L62-65) thus providing the predictable result of stabilizing the robot arm.

Upon the combination said adjacent spherical surfaces of said first, second and third link members are keyed or bonded to one another such that during articulation of the arm said third link (Irwin) rotates about a point of rotation relative to said first link and the distance between the spherical surfaces (88, 90) of said first and third links

remains substantially constant; and said elastomeric material is maintained under compression by said at least one wire such that substantially no compressive deformation of said elastomeric material occurs during rotation.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Stelle and provide a resilient elastomer bearing disposed between two members and the elastomer is bonded to both of the first and second link members, and is sufficiently thin and maintained under compression, as taught by Irwin, for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling thus providing the predictable result of stabilizing the robot arm.

Response to Arguments

4. Applicant's arguments, see Remarks, filed 5/30/07, with respect to the rejection(s) of all claim(s) under Steele in view of Raines and Steele in view of Balczun have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly found reference to Irwin.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Pilkington whose telephone number is (571) 272-5052. The examiner can normally be reached on Monday-Friday 8:00AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571) 272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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9/5/07


RICHARD RIDLEY
SUPERVISORY PATENT EXAMINER